CRAMER CREEK TIMBER SALE ENVIRONMENTAL ASSESSMENT

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Montana Department of Natural Resources and Conservation
Missoula Unit Office

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INTRODUCTION TO THE ENVIRONMENTAL ANALYSIS

The Cramer Creek Timber Sale Environmental Analysis consists of four chapters:

I. Chapter One- Purpose and Need for Action

A. This chapter outlines the project and explains the purpose and need for actions associated with the project.

B. Explains the process used to obtain public and specialist input and the issues analyzed in the EA.

II. Chapter Two- Alternatives

A. This chapter describes the alternatives evaluated in this analysis. The action and the no action alternative are presented in detail.

B. Provides a summary comparison of environmental effects of the alternatives.

III. Chapter Three- Affected Environment

This chapter presents the existing environment, which would be affected by the actions associated with the project.

IV. Chapter Four- Environmental Effects

This chapter explains the environmental effects of both alternatives.

CHAPTER I

PURPOSE AND NEED FOR ACTION

PURPOSE AND NEED FOR ACTION:

The Montana Department of Natural Resources and Conservation (DNRC) proposes to harvest timber in the Cramer Creek area. This action would harvest approximately 21,000 tons of timber from 500 acres. If the Action Alternative were selected, the proposed action would be implemented in the summer of 2002.

The lands involved in this proposed project are held by the State of Montana in trust for the support of specific beneficiary institutions. These include public schools, state colleges and universities, and other specific state institutions such as the School for the Deaf and Blind (Enabling Act, February 22, 1889; 1972 Montana Constitution, Article X, Section 11). The Board of Land Commissioners and Department of Natural Resources and Conservation (DNRC) are required by law to administer these trust lands to produce the largest measure of reasonable and legitimate advantage over the long run for these beneficiary institutions (Section 77-1-202, MCA). On May 30, 1996, the Department released the Record of Decision on the State Forest Land Management Plan (SFLMP). The Land Board approved the SFLMP's implementation on June 17,1996. The SFLMP outlines the philosophy of DNRC for the management of state forested trust lands, and lists specific Resource Management Standards for ten resource categories.

The Department will manage the lands involved in this project according to the philosophy and standards in the SFLMP, which states the following:

> Our premise is that the best way to produce long-term income for the trust is to manage intensively for healthy and biologically diverse forests. Our understanding is that a diverse forest is a stable forest that will produce the most reliable and highest long-term revenue stream. ... In the foreseeable future timber management will continue to be our primary source of revenue and our primary tool for achieving biodiversity objectives (DNRC, SFLMP Record of Decision 1996 [ROD-1]).

PROJECT OBJECTIVES:

In order to meet the goals of the management philosophy adopted through programmatic review in the SFLMP, the Department has set the following specific project objectives:

1. To manage the forest for appropriate or desired future conditions, characterized by the proportion and distribution of forest types and structures typical of those represented under average historic conditions.
2. Harvest approximately 21,000 tons of sawtimber to generate a net positive rate of return for the Common School (CS) grant.

LOCATION:

The project area is in sections 16 and 21, T 12 N., R 15 W., Missoula County. This area is within the Camas and Cramer Creek drainages, approximately 25 miles east of Missoula, Montana. Camas Creek is a tributary of the Blackfoot River and Cramer Creek is a tributary of

the Clark Fork River.

RELATIONSHIP TO THE STATE FOREST LAND MANAGEMENT PLAN:
In June 1996, DNRC began a phased-in implementation of the SFLMP. The SFLMP established the agency's philosophy for the management of forested trust lands. The management direction provided in the SFLMP comprises the framework within which specific project planning and activities take place. The SFLMP philosophy and appropriate resource management standards have been incorporated into the design of the proposed action.

DECISIONS TO BE MADE FROM THIS EA:
1. Determine if alternatives meet the objectives of the project.

2. Determine which alternative should be selected.

3. Determine if the selected alternative has a significant impact on the human environment.

4. Determine if an Environmental Impact Statement (EIS) is required.

PUBLIC INVOLVEMENT, AGENCIES, GROUPS AND INDIVIDUALS CONTACTED:
Comments from the general public, interest groups and agency specialists were solicited in the Fall of 1999. Newspaper ads were run in the Missoulian, on October 20, 27 and November 3 1999. Public notices were posted along roads within the proposed sale area. Scoping letters were mailed to 10 organizations and individuals. (A list of the organizations/individuals contacted is available in the project file.) Written and/or verbal comments were received from the following individuals and organizations: Ecology Center, Missoula; Dan Lessnau, Clinton; and the Confederated Salish and Kootenai Tribes of the Flathead Nation. An on-site tour and discussion was conducted with Dan and Karen Lessnau, adjacent landowners to the state land.

The following resource specialists were involved in the project design, assessment of potential impacts, and development of mitigation measures: Bob Rich- Forester, Missoula Unit DNRC; Rosemary Leach - Wildlife Biologist, Southwest Land Office (SWLO) DNRC Missoula, Jeff Collins - Soil Scientist, (FMB), DNRC, Missoula; George Mathieus - Hydrologist, FMB, DNRC, Missoula; Pat Rennie - Archaeologist, Agriculture and Grazing Management Bureau, DNRC, Helena

ISSUES:

SOILS

* Equipment operations during timber harvest on sensitive soils (steep slopes and wet sites) can result in soil rutting, compaction and displacement, and erosion.

* Long-term soil productivity can be reduced depending on area and degree of physical effects, amount and distribution of coarse woody debris retained for nutrient cycling.

* BMPs need to be followed in all phases of road construction and maintenance.

WATER QUALITY

Land management activities such as timber harvest and road construction can impact water quality primarily by accelerating sediment delivery above natural levels to local stream channels and draw bottoms. These impacts are caused by erosion from road surfaces, skid trails, log landings and by the removal of vegetation along stream channels.

CUMULATIVE WATERSHED EFFECTS

These can be characterized as impacts on water quality and quantity that result from the interaction of disturbances, both human-caused and natural. Timber harvest activities can affect the timing of runoff, increase sediment yields, increase peak flows and increase the total annual water yield of a particular drainage.

COLD WATER FISHERIES

Land management activities such as timber harvest and road construction can impact fish habitat primarily by increasing water temperatures, accelerating sediment delivery above natural levels to local stream channels and by decreasing large woody debris input and shade cover through the removal of recruitable trees near the stream channel.

NOXIOUS WEEDS

Noxious weeds are exotic species that are highly invasive and frequently out compete native plants and other desirable species of vegetation. They are often favored by soil disturbance that results from road building, logging activities and other types of equipment operation. Weed seed can also be carried into a weed free area on equipment and vehicles. Noxious weeds reduce forage for livestock and native wildlife and also reduce the biodiversity of native plant communities.

NATURAL FOREST CONDITIONS

The SFLMP directs the DNRC to emulate natural disturbance patterns on the landscape through management. Will the proposed action emulate natural disturbances and forest structures.

LARGE-SIZED TREES (> 20 INCHES DBH), SNAGS AND COARSE WOODY DEBRIS

Timber harvest and associated road building can remove large-sized trees, snags, and coarse-woody debris, and interrupt the processes that produced and continue to maintain these components over time. As a result, habitats can be rendered less suitable or unsuitable for wildlife species that are associated with large-sized trees, snags, and coarse woody debris. Processes that shape these components are complex and generally require the passage of considerable time (heart rot, decay, insect infestation, etc.). Road access can contribute to loss of snags or snag recruits by allowing firewood cutting. Lists of species associated with snags and coarse woody debris are in the SFLMP Appendices. Species associated with large-sized trees, many of which use habitat patches with interior forest conditions can be found in discussions of species that use relatively unharvested areas (Hutto and Young 1999, Hejl et al. 1995, Hejl 1994) or on old growth lists (SFLMP Appendix).

OVERSTORY COVER AND MOVEMENT CORRIDORS

Timber harvesting reduces or removes overstory cover, thereby decreasing habitat security for some species. The effectiveness of movement corridors can be rendered less suitable or unusable following harvest operations for species that use these linkages between habitats. Examples include small mammals, birds, big game, grizzly bear, lynx, and fisher. This is particularly important where overstory canopy cover has been altered in the surrounding landscape. Habitat fragmentation can also result from timber harvest activities which can influence the size, shape and juxtaposition of habitat patches across the landscape.

ROAD-BUILDING

In general, high road densities decrease habitat security and quality for many wildlife species, compared to similar habitats without high road densities. In addition, high road densities can contribute to loss of snags and potential snag recruits due to firewood cutting. If roads are closed to vehicles, unauthorized access may occur such that security or habitat quality is compromised. The presence of a road can allow easier snowmobile, bicycle, foot and horseback traffic, even if roads are closed to vehicles

ENDANGERED, THREATENED, AND SENSITIVE SPECIES

Timber harvest and associated road building can remove or alter habitats associated with endangered, threatened, and sensitive species. As a result, populations could decrease and recovery efforts could slow. These species and the effects of the proposed action upon them are discussed in Appendix A.

List of Permits Needed: None

Other Environmental Documents Pertinent to the Area: Ryan Gulch Fire Salvage Environmental Assessment

CHAPTER II

ALTERNATIVES

INTRODUCTION

The purpose of Chapter 2 is to describe the alternatives and compare the alternatives by summarizing the environmental consequences.

DEVELOPMENT OF ALTERNATIVES

Alternatives were planned through scoping and development of issues, input from Interdisciplinary Team (IDT) specialists, and guidance from resource management standards from the SFLMP. In addition, compliance with trust mandates helped to shape alternatives.

ALTERNATIVES CONSIDERED:

ALTERNATIVE A- NO ACTION

No land management activities would be implemented under this alternative. No road construction or reconstruction would occur. No revenue would be generated for the common school trust.

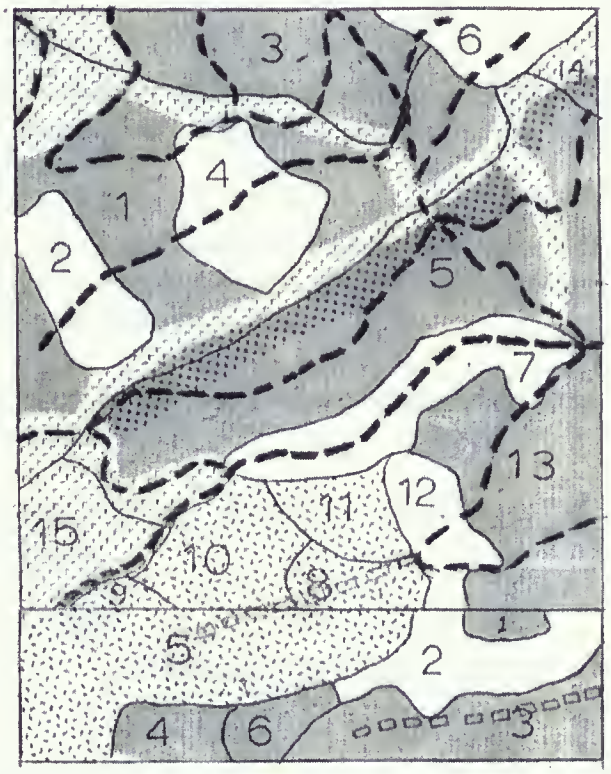
ALTERNATIVE B- ACTION

Harvest approximately 21,000 tons of sawtimber, from approximately 500 acres. Construct approximately 1.0 mile of new road and reconstruct and improve approximately 8 miles of existing roads (Figure 1, Alternate B Map). The proposed new roads are temporary and would be ripped, grass seeded and slashed at the end of the sale. All roads except for the main public road in Section 16 and the access road to a private residence would be closed by gates or berms. This alternative would provide $750,000 return to the common school trust. Approximately 360 acres of Douglas-fir stands would be harvested with a selection and shelterwood cut. This would remove roughly 65% of the current stand canopy and retain dominant vigorous trees to regenerate the stand. Areas with primarily smaller yet healthy trees would be thinned to improve growth. This would result in a residual stand that has 46 trees per acre and average 12" in diameter. Logging would be done with ground based equipment except for 25 acres in the south portion of section 21 that would be logged by a cable yarding system due to steep slopes. Logging slash would be jackpot burned within the harvest units. The remaining 140 acres in the project area is a nearly pure lodgepole pine stand that is overstocked with small diameter trees. This stand would be commercially thinned retaining the dominant trees and species other than lodgepole pine. Roughly 65% of the tree canopy would be removed. The residual stand would have 140 trees per acre, which would average 8" in diameter. Logging would be done with a cut-to-length logging system, which processes trees into logs at the stump. Logging slash would be left on skid trails and crushed down by equipment during skidding. Commercial thinning in a small sawlog and pole size Lodgepole stand serves to hasten the natural thinning that takes place in the stem exclusion phase of stand development. Trees that would normally die as a result of competitive stress would be harvested to allow the remaining trees to grow more rapidly. The largest and most dominant trees would be the ones selected as leave trees. These would also be the trees most likely to survive natural competition in the stand. Thinning was selected as the silvicultural treatment for this stand rather than a regeneration harvest due to the good vigor of the current stand and good potential for future increase in growth and value.

ALTERNATIVE B
Figure 1

RETAIN 30-40 FT/AC
RETAIN 70 FT/AC
RETAIN 50 FT/AC
NO ENTRY
OLD HARVEST UNITS
EXISTING ROAD
NEW ROAD
STAND NUMBER 4

N



SECTION 16

SECTION 21

MITIGATION MEASURES OF THE ACTION ALTERNATIVE

Soils Mitigation Measures

- Limit harvesting operations to periods when soils are relatively dry, frozen to 3" depth or snow covered to at least 12"deep.

- The logger and sale administrator agree to a general skidding plan prior to equipment operations. Limit tractor ground skidding to slopes less than 45%, unless using a soft track yarder (FMC). On ground skidding units with less than 35% slope rubber tired skidders are preferred, grapple cats would be limited to slopes less than 30% unless on designated skid trails at least 50 ft. apart.

- Cable log harvest units on slopes over 45% to protect soil and water resources.

- For long term soil productivity, avoid displacement and minimize scarification to 30-40% of sites were required for silvicultural needs. Leave 10-15 tons of large woody debris for nutrient cycling and to maintain long term soil productivity.

- Complete a road inventory to identify appropriate drainage required to comply with BMP's.

- Construct all new roads for cable harvest units to a 14 ft. width to allow for line machine access. Road cutslopes finished to stable angles of 1:1 for common material, and as will stand for bedrock.

- Construct all new roads with adequate drainage and rolls in grade. Maximum grade should not exceed 8% except for short pitches. Use an Erosivity Index of 30 for general spacing of road drainage features.

- Road construction on slopes over 35% would require an excavator for pioneer road construction.

- Grass seed new road cutslopes, fillslopes and landings within 10 days of rough shaping with site adapted grass.

Watershed Mitigation Measures

- Plan, design and improve existing road systems to meet long-term access needs and to fully comply with current BMPs.

- Construct drain dips, grade rolls and other drainage features where necessary and practical to insure adequate road surface drainage. Install and maintain all road surface drainage concurrent with new road construction, reconstruction and reconditioning. Drain dips constructed on sustained road grades greater than 8% may require gravel surfacing to function properly. Sustained road grades greater than 10% may require installation of conveyor belt water divertors.

- Grass seed all newly constructed or reconstructed road cut and fills immediately after excavation.

- Leave all temporary or abandoned roads in a condition that would provide adequate drainage and would not require future maintenance. Partially obliterate abandoned roads through ripping and seeding. Where it is available, scatter slash across the ripped road surface. Install water bars at regular intervals to facilitate surface drainage.

- Close the existing road that is at the bottom near the Camas Creek junction. Install a steel gate or guard rail curbing to help prevent vehicle use. In addition to closing this road with a barrier, ensure that the road prism is left in an abandoned condition as stated in the above recommendation.

- Construct additional drainage features on all approaches to draw and stream crossings to avoid concentrating runoff at crossing sites. Drainage features should be located close enough to the crossing to minimize the runoff contributing area, but at an adequate distance away from the crossing to provide for effective sediment filtering.

- Provide effective sediment filtration through the use of slash filter windrows, filter fabric fencing or straw bales along drainage features located in areas with inadequate buffer capacity. Note: straw bales alone may not be effective in areas with heavy concentrations of livestock or big game.

- Filter outlets of all ditches with direct delivery to streams or ephemeral draws at the outlet by using slash, filter fabric and straw bales.

- Incorporate slash filter windrows at all draw and stream crossings requiring fills that are more than 2 feet deep.

- Rock armor both the inlet and outlet of all CMP installations. Provide energy dissipaters at outfall of all CMP installations. Rock used for armoring should average 12 inches in diameter and be not less than 6 inches in diameter.

- When excavating material in and around stream and draw crossings (i.e. installing new CMPs, cleaning inlets and outlets, constructing ditches, etc.), special care should be taken

to avoid an excessive amount of disturbance to the stream channel or the area immediately adjacent to the crossing sites. Excess or waste material should be disposed of at a location outside of the SMZs and where it will not erode directly into the stream or draw bottom.

- Limit road use and hauling to dry, frozen or snow covered conditions. Suspend operations when these conditions are not met before rutting occurs.

- All new stream crossings, cross drains and relief culverts would require hydrologist input for design recommendations. Rock armor all inlets and outlets and design length to accommodate slash filter windrows.

- Where feasible, rip, seed, water bar and slash any non-system roads within the sale area concurrent with construction activities.

- Implement weed control to help reestablish ground cover for erosion control and to reduce weed spread.

- Implement Forestry BMPs as the minimum standard for all operations with the proposed timber sale.

- Use minimum SMZ width required under SFLMP Watershed RMS # 10. These widths may be greater than those required under the SMZ Law and Rules. The SMZ widths prescribed in Watershed RMS # 10 are dependent on: the erosion potential of soils at the site, the steepness of the side slope and the presence of any topographic breaks.

- Protect all ephemeral draws, springs and wet areas with marked equipment restriction zones (ERZ). If absolutely necessary, designate locations for skid trail crossings. Minimize the number of crossings and space at 200 feet where feasible. This will minimize soil disturbance within the vicinity of the draws. Use designated crossings only under dry or frozen conditions.

- Grass seed skid trails over 30%. Pile slash on skid trails where feasible.

- No slash burning may occur in or near areas of concentrated ephemeral flow.

Noxious Weed Mitigation Measures

- All road construction and harvest equipment would be cleaned of plant parts, mud and weed seed to prevent the introduction of noxious weeds. Equipment would be inspected by a Forest Officer prior to moving on site.

- All newly disturbed soils on road cuts and fills would be promptly reseeded to site adapted grasses to reduce weed encroachment and stabilize roads from erosion.

- Weed treatment measures may include herbicide treatment of noxious weeds. Where herbicide treatments are required by the Forest Officer, herbicide would be applied under the supervision of a licensed applicator following label directions in accordance with Department of Agriculture regulations, applicable state laws and rules, and regulations of the Missoula County weed board. No herbicides would be applied near surface water.

- DNRC would monitor the project area for two years after completion of harvest to identify if noxious weeds occur on the site. If new noxious weed infestations occur, a weed treatment plan would be developed and implemented.

Wildlife Mitigation Measures

- If any endangered or threatened species are encountered during project planning or implementation, all project-related activities would cease and a DNRC wildlife biologist would be informed immediately. Additional habitat protection measures would be implemented as appropriate.
- If active nests of an owl or other raptor were located, activities would stop until the biologist and the sale administrator could visit the site. Nest trees and all overstory trees in a 100-foot radius would be retained. Timing restrictions or nest stand protections may be implemented as well.
- Prior to logging, the DNRC would confirm the current wolf status in the vicinity with the U.S. Fish and Wildlife Service, Helena.
- If caves or mines are found in the project or analysis areas, then a DNRC biologist would be notified, and appropriate habitat protection or timing measures would be implemented for bat protection.
- Return skid slash to harvest units to provide coarse woody debris for associated species
- All new and temporary roads would be closed with earth berms or gates. All new and temporary road surfaces would be grass seeded. Gates or berms would close all roads except for the main public road in Section 16 and the access road to a private residence located just west of the project area.
- No harvest along ridge in Section 16 and along draw for movement corridors.
- Cut no snags unless they pose a safety hazard.
- Six miles of currently open roads would be closed with gates or berms.

CHAPTER III
AFFECTED ENVIRONMENT

INTRODUCTION

This chapter discusses the existing environment and includes effects of past and ongoing management activities within the analysis area.

SOILS
AFFECTED ENVIRONMENT

The proposed sale area is located on terrain of moderate to steep mountain sideslopes with some abrupt slope breaks and deeply incised draws that reflect the structural bedrock control of the landscapes. Bedrock is mainly Missoula group argillites, which are well fractured at depth, and form skeletal soils with high gravel contents.

No especially unique or unstable terrain was noted in the project area. Bedrock is exposed along the ridgeline and upper mountain sideslopes. Most material should be common excavation for road construction, with the exception of the bedrock outcrops and very shallow soil areas that would require ripping for road construction. Material quality is excellent for roads and generally well drained.

Soil types were described using the Missoula County Soil Survey. Vegetation type and surface conditions vary by aspect with volcanic surface soils and moister sites more common on north aspects.

The dominant soil types found on northern aspects are Whitore gravelly loam series soils (soil map unit 122 and 123) forming in limestone colluvium. This series exhibits carbonate horizons that could limit rooting depth and productivity. The Whitore soil on the project area will have a thin layer (less than 3 inches) of gravelly clay loam topsoil over a deep layer of gravelly loam subsoil. Due to the texture and thickness of topsoil, displacement risk for this type of soil is high. The erosion and compaction risk are moderate.

The dominant soil series for the moderate slopes and ridge noses of Cramer Creek is Trapps gravelly loam (soil map unit 108). This site will be more productive than that of the north facing aspects due to the lack of carbonates that will limit rooting depth. The Trapps series found on this project area will have a thin (less than 3 inches) layer of gravelly loam over a deep sub-soil layer (greater than 40 inches) of gravelly clay loam. This series has droughty tendencies in areas of southern aspect due to coarse texture. This soil type can be easily displaced by equipment operations due to depth and texture of topsoil. Erosion and compaction risk will be minimal.

The steeper southern facing slopes in the Cramer creek project area will consist of the Repp very gravelly loam series (soil map units 89-91). These soils will also exhibit a carbonate layer at 40 inches, which will limit productivity in regards to the depth of rooting. These soils will have a

thin layer of gravelly loam topsoil (less than 3 inches) over a thick layer of extremely gravelly loam. Due to the aspect at which these soils are found, and the soil texture, these soils have droughty tendencies. The potential for displacement in the Trapps series will be high due to the texture and slope of the site. Erosion will also be an issue due to the lack of fine materials. There will be a slight risk of compaction for this series on this area.

Cumulative Effects of Past Actions on Soils:
There have been at least two previous harvests in the project area. An even age harvest in the 1980s was on mainly moderate slopes with conventional tractor harvest. Roads were improved to establish road drainage and several road closures were made. Older harvest (30 years old) is apparent on most moderate slopes in the section. Old skid trails are indicated by thick regeneration and some ruts in spots. In the Cramer Creek project area, ground transects were taken to assess existing cumulative effects. In the central part of section 16, approximately 5-9% of the area was in a displaced condition and compaction was observed on about 15% of the area. In the seed tree harvest stands in the northern part of sections 16 and 21 past effects were roughly 29 % of the area with about 2 % in a compacted state. Cumulative effects to soil productivity within the project area are of some concern in the seed tree area. Future stand entries would likely use existing roads, trails and landings and therefore present a low risk of cumulative effects.

Coarse Woody Debris:
Three transects were taken to assess the current condition of coarse woody debris compared to recommendations about site productivity and nutrient recycling. The recommendations based on habitat types present on the site, (Psme/Syal, Psme/Caru, Psme/Libo and Psme/Vaca) is 7.5 to 16.5 tons per acre for optimal productivity and nutrient capabilities.

The northern part of section 21 and the southern part of section 16 have an average of about 10.7 tons per acre. The recent clear-cut in the central part of section 16 has about 14 tons/acre and most sites are within the recommended ranges for coarse woody debris. The only area that did not meet the recommendations was the area adjacent to the clear-cut units. This area had an average of about 3.1 tons per acre, which is below historic conditions.

BACKGROUND ON WATERSHEDS

Description of Watersheds:
The proposed sale area is located within two state sections that lie along two watershed divides, Cramer Creek and Camas Creek, which drain into the Clark Fork and Blackfoot Rivers respectively. One unnamed tributary of Cramer Creek and two unnamed tributaries of Camas Creek drain the proposed sale area (see figure 2, Watershed Analysis Area Map).

WATERSHED
ANALYSIS MAP
Figure 2

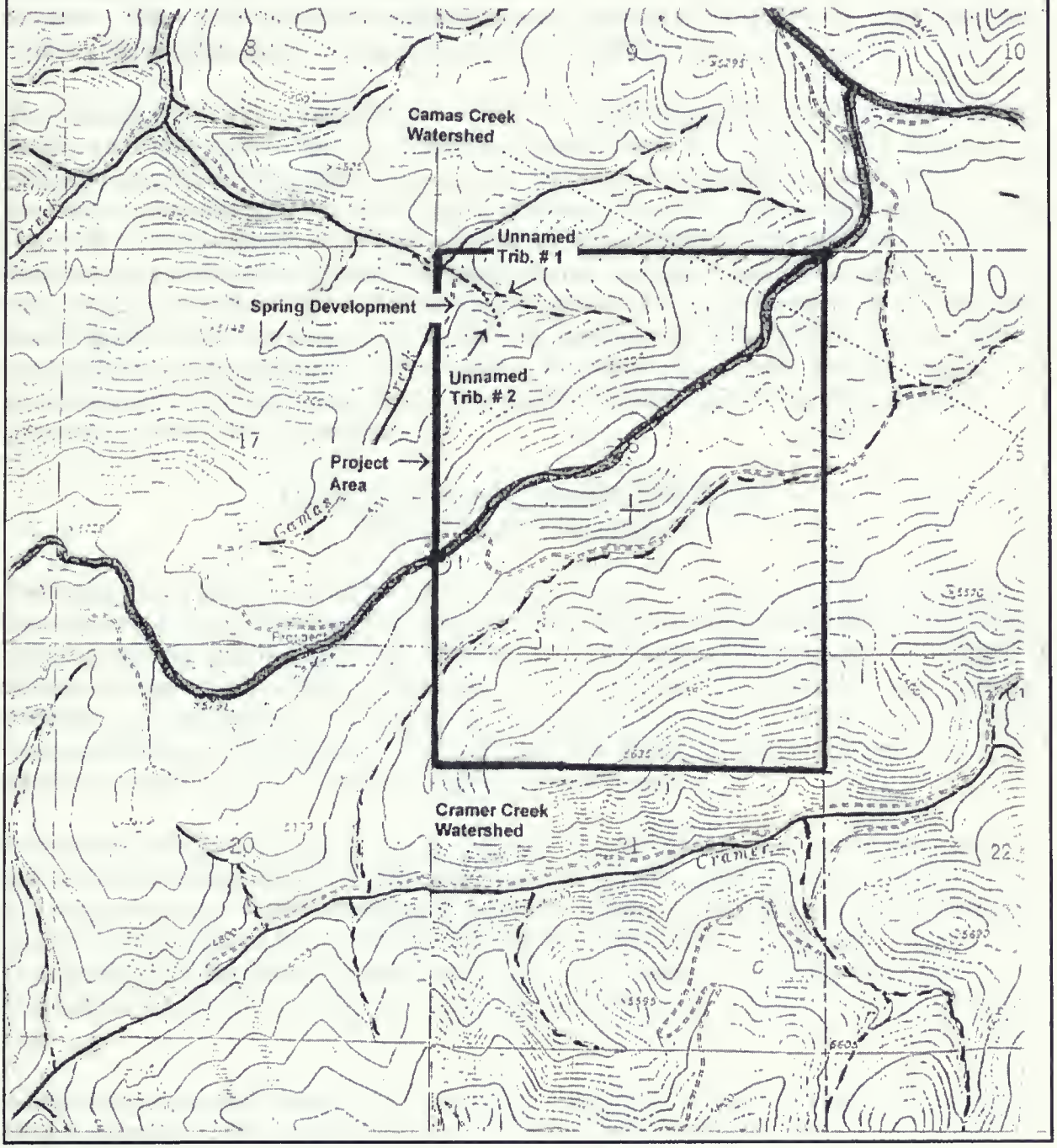
Cramer Creek is a 17,067-acre watershed, which receives approximately 20-25 inches of annual precipitation. This third order stream is intercepted by irrigation ditches and ultimately a pond near its confluence with the Clark Fork River. During seasonally high flows, it is expected that surface waters from Cramer Creek reach the Clark Fork River. Cramer Creek is a Class I perennial stream according to the Montana Streamside Management Zone Law and Rules.

Camas Creek is an 11,909-acre watershed, which receives approximately 20 inches of annual precipitation. This third order stream is intercepted by irrigation ditches in the valley bottom prior to its confluence with Union Creek. Camas Creek is a Class I stream according to the Montana Streamside Management Zone Law and Rules.

Two unnamed tributaries to Camas Creek noted as Tributary #1 and #2 (see figure 3, Watershed Project Area Map) drain the proposed area. Both streams contain segments of ephemeral and perennial flow. Surface flow begins approximately 100 meters from their confluence with Camas Creek. Ephemeral draws or swales drain the rest of the proposed sale area. These draws and swales have minor evidence of erosion resulting from cattle trampling, however these features appear to be in stable condition.

Regulatory Framework:
This portion of the Clark Fork River basin, including the Cramer and Camas Creek drainages, are classified B-1 in the Montana Water Quality Standards. Existing beneficial uses in the immediate vicinity of the proposed sale area include water rights for groundwater sources to include: stock, lawn/garden, irrigation, mining, and domestic uses. Surface water sources include: irrigation, new sprinkler irrigation, new flood irrigation, flows through fishpond (non-consumptive) and stock uses. There are no sensitive beneficial uses allocated in the sale area, however; downstream sensitive beneficial uses include aquatic life support and cold water fisheries. Cramer Creek (MT76E004020) is currently listed as a water quality limited water body (as per Section 303(d) of the Clean Water Act) in the 305(b) report. Both the Montana Streamside Management Zone (SMZ) Law (MCA 77-5-301) and Rules and the Montana Stream Protection Act (MCA 87-5-501) pertain to the proposed activities.

WATERSHED
PROJECT AREA MAP
Figure 3



WATER QUALITY
AFFECTED ENVIRONMENT

Approximately 8 miles of Plum Creek Timber Company (PCTC), Louisiana Pacific (LP) and small private cost-share road provide access to the sale area. The majority of this road system is a gravel-surfaced, high standard design lacking only sufficient road surface drainage in isolated locations. These portions of the road system would require routine maintenance (ditch and CMP cleaning and drainage feature reshaping) to meet current BMP standards.

The road densities on state ownership are extensive, constituting approximately 7.5 miles within Section 16, T12N-R15W. Portions of these road systems do not meet current BMP standards. Excessive spacing between functioning drainage features and two undersized culverts has resulted in inadequate road surface drainage within state ownership. Unnamed tributary # 1 has a two-track road immediately adjacent to the draw and stream channel. This road travels directly down the draw feature that supports this stream channel. An existing drive-through ford supporting this road exists adjacent to the Camas Creek road. The ford crossing is unstable and travels through a wet, boggy area with low bearing capacity soils. This boggy area has likely resulted from ponding at the inlet of two culverts. No coarse rock or other materials exist through the ford, resulting in erosion and compaction. This has resulted in gully erosion and sediment delivery to the stream channel.

CUMULATIVE WATERSHED EFFECTS
AFFECTED ENVIRONMENT

Past management activities in both watersheds include mining, grazing, fire suppression, road construction and timber harvest. Timber harvest activities have been extensive over the past 30 years, constituting approximately 7651 acres in Cramer Creek and 8391 acres in Camas Creek. In addition to past management activities, portions of the Cramer Creek drainage were subjected to burns of varying intensities during the Ryan Gulch wildfire of August 2000. The Ryan Gulch fire consumed approximately 17,118 acres. Effects from the fire cover a full range of burn intensities, however, only severe burn intensities were mapped.

Within the Ryan Gulch Fire analysis area, increases in peak flows, surface runoff, erosion and subsequent sedimentation delivery, nutrient levels and stream temperatures are anticipated following the recent wildfire. Measurable quantities of these impacts may vary across the fire area and would be dependent on the nature of the stream channels, intensity of the burned areas, local geology, and the timing duration and intensity of snowmelt and spring rain events. Measurable impacts are more likely to occur in perennial drainages where burn intensities are high.

A cumulative watershed effects (CWE) analysis for the proposed sale area was completed by DNRC to determine the existing conditions of the affected watersheds and the potential for

cumulative effects due to increased water and sediment yields. The Cramer and Camas Creek watersheds were chosen as the analysis boundaries. These analysis areas were selected because they were determined to be the most appropriate scale to detect potential effects. A summary of recent research suggests detection of hydrologic cumulative effects should focus on third-to fourth-order basins (NCASI, 1999).

To adequately reflect both past timber management activities and the Ryan Gulch Fire, this analysis was completed using the Equivalent Clearcut Area (ECA) methodology outlined in Forest Hydrology Part II (Region 1- USFS, 1974). This methodology was also used to estimate existing Water Yield Increases (WYI) in the Cramer Creek watershed. WYI is calculated as a function of area (acres) treated, percent forest crown removal, precipitation patterns and estimates of the amount of hydrologic recovery due to vegetative regrowth. To accurately describe the natural effects of the Ryan Gulch Fire (2000), a fire intensity map was obtained from local experts that describes burn intensities on the entire burn. Only high intensity burned areas were mapped across all ownerships. It's expected that snow redistribution, evapotranspiration and canopy interception have been greatly reduced following the wildfires. Anticipated WYI resulting from these fire effects were estimated by developing a relationship between equivalent clearcut area and fire intensity. An ECA factor that was based on percent canopy burned was assigned for each level of fire intensity. These ECA factors where then used to calculate ECA and the potential resulting WY increase expected to occur for each unit of area.

Harvest history and road information compiled for this analysis was obtained from Plum Creek Timber Company, DNRC harvest records, Bureau of Land Management (BLM) database, and BLM 1996 aerial photos.

Models used to predict ECA and WYI typically overestimate due to the fact that the model assumes 100% forest cover prior to management activities. Given the historic fire regime in the Camas and Cramer Creek watersheds, complete canopy cover was highly unlikely. Using local knowledge of characteristics indicative of ponderosa pine and Douglas-fir stands in the Missoula area, estimations of historic canopy cover were made using 1996 aerial photographs. Expected historic canopy cover ranged from 35-85%, depending on slope, aspect and elevation. The results of this analysis are summarized below in table 1:

TABLE 1:

CRAMER CREEK PROPOSED TIMBER SALE
Watershed Existing Conditions Analysis

Watershed	Drainage Pattern	Total Acres	Existing Road Miles*	Total ECA	Area in ECA	Water Yield Increase**
Cramer Creek	Perennial	17067	125	3828 acres	22%	~10.1%
Camas Creek	Perennial	11909	93	3210 acres	27%	~12.1%

* Existing road miles were estimated off of 1996 aerial photographs and USGS quads.
** Water Yield Increase (WYI) is an estimate of percent water yield over expected natural levels due to management activities and the Ryan Gulch Fire.

All primary and secondary roads within the proposed sale area were evaluated for past or potential impacts. Field evaluations indicate that past management activities within the analysis area have resulted in impacts to water quality. These impacts are limited to sediment delivery and erosion from roads and cattle use, and are restricted to stream crossings and isolated segments of existing roads. Results from the existing cumulative watershed effects analysis estimate increases in average annual water yield due to timber harvest and road construction in Camas Creek and Cramer Creek to be below the 15% threshold set by DNRC.

COLD WATER FISHERIES
AFFECTED ENVIRONMENT

There are no known fish bearing streams draining either of the state sections in the proposed sale area. The majority of the sale area has drainage features that do not support fish. Population data sampled by the Bureau of Land Management in the early 1980's indicate that westslope cutthroat, rainbow and brook trout are present in the mainstem of Cramer Creek and some of it's tributaries above and below the State's proposed sale area. No fish data for Camas Creek is available, however, it is likely that isolated populations of trout exist in the perennial reaches.

Drainage features within planned harvest units are ephemeral at best, and therefore do not support fish. Past grazing and timber management have resulted in increased sediment delivery and a decrease in the riparian shrub component and recruitable trees for in-channel large woody debris along existing tributary stream channels. It is likely that these impacts have resulted in loss of shade cover, bank stability, recruitable trees and increased temperatures.

NOXIOUS WEEDS
AFFECTED ENVIRONMENT

Predominant weeds in the area are spotted knapweed and lesser areas of sulfur cinquefoil and thistle. Knapweed occurs along portions of most existing access roads mainly on drier southerly aspects, droughty sites and in open range sites.

NATURAL FOREST CODITIONS
AFFECTED ENVIRONMENT

The habitat types (h.t.) in the project area all belong to Fire Group 6 as defined by (Fischer and Bradley 1987). Douglas-fir is both the indicated climax species and a vigorous member of the

seral component. It is not uncommon for Douglas-fir to dominate all stages of succession. Ponderosa pine, western larch and lodgepole pine are seral components whose abundance varies by phase. Fire history studies conducted with the PSME/CARU h.t. in southwest Montana indicate a mean fire interval of 42 years, for pre-settlement stands. A tentative mean fire-free interval of 15.8 years was reported within a PSME/PHMA h.t. near Missoula, Montana. Fire was an important agent in controlling density and species composition. Low to moderate severity fire converted dense stands of pole-sized or larger tress to a more open condition, and subsequent light burning maintained stands in open conditions. Frequent low or moderate fires favored larch and ponderosa pine over Douglas-fir where these species occurred. Severe fires probably occurred on dense, fuel-heavy sites and resulted in stand replacement. Stand replacement fires favored lodgepole pine on sites where this species was present. Fire's role as a stand replacement agent becomes more pronounced when the natural fire-free interval is increased through fire suppression, unless corresponding fuel reduction occurs. The theoretical climax condition on Group Six is a multistoried Douglas-fir stand, although a fire-maintained open forest condition was the normal situation during the pre-settlement period. Depending on the stage of stand development and the fire severity, fire may maintain the site in a shrub and herb stage, thin the stand or in the case of a severe fire replace the stand and revert it to the shrub and herb stage. Climax Douglas-fir stands are more likely to occur on sites where Douglas-fir is the climax species as well as the seral dominant, notably on sites within the PSME/CARU-CARU and PSME/ PHMA-PHMA habitat types. Frequent low to moderate fires in the climax conditions on these sites will create a more open, parklike stand of Douglas-fir, whereas a severe fire returns the stand to the shrub and herb stage (Fischer and Bradly 1987).

Figure 4 Is an aerial view of the project area as it appeared in 1938. No harvest had taken place at this time and the effects of fire suppression were less than 25 less years old. As the photo shows, south facing slopes were rather open and clumpy in nature. They also appear to be occupied by large crowned trees. North slopes in the northern portion of section 16 are dominated by a dense stand of Douglas-fir. Much of the north slopes in the southern portion of section 16 and the northern portion of section 21 have recently been burned by a stand replacing and mixed severity fire in the 1920s. Regeneration is evident in this burn as well as patches of large trees that were not killed by the fire. This portion of the project area demonstrates the variable role that fire can play in this type of a fire group. Large crowned trees with canopy cover in excess of 50% are visible along the main ridge in section 16 and along the draw in the north central portion of section 16. These are likely areas that burned with a non-lethal intensity due to their location on the ridge top or draw bottom, again demonstrating the variable role fire can play in stand development.

1938 Air Photo
Figure 4

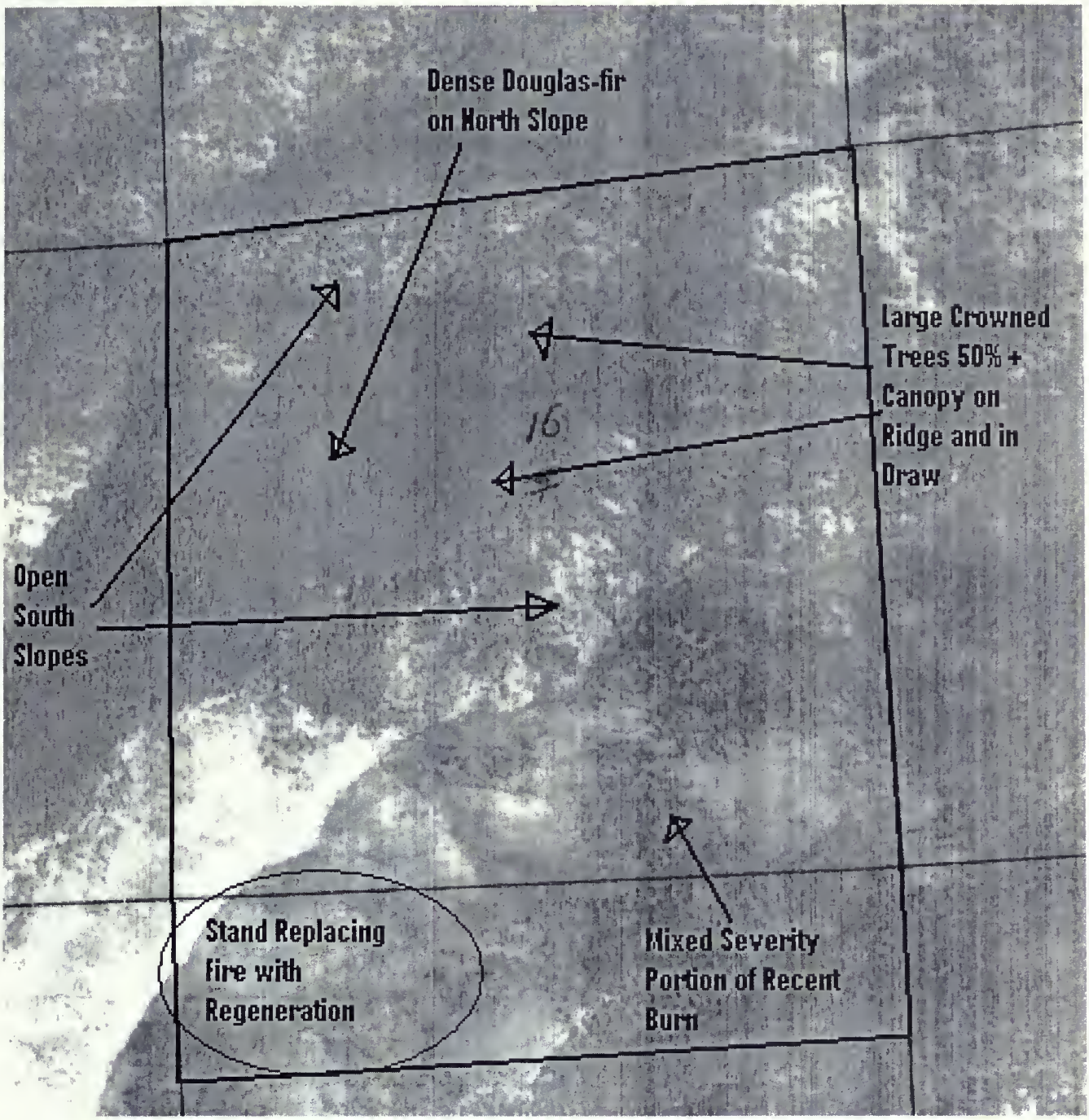


Figure 5 is an aerial view of the project area as it appeared in 1993. There is no record of harvest in the project area until 1950. Since that time the following timber volumes have been removed.
Ponderosa Pine- 0.1 Million Board Feet
Douglas-fir- 3.6 Million Board Feet
Lodgepole Pine- 0.4 Million Board Feet
Nearly all of this volume was harvested in four separate projects in 1950, 1952,1976 and 1990. The nature of the 1950s era harvest, which totals nearly 1.0 Million Board Feet is unknown. Harvest in 1976 created a 30 acre clearcut in a draw bottom lodgepole pine stand, which is now regenerated with large sapling size regeneration. The 1976 harvest also removed approximately 30% of the canopy over much of section 16 with a partial cut. The 1990 harvest created 4 clearcut units of approximately 80 acres and one shelterwood unit of 35 acres. All of these 1990 units are well stocked with regeneration. These harvests have perforated the area with regeneration cut units and reduced the stocking in the areas that were partially cut, however the canopy has filled in since this partial cutting was done in 1976. The area that burned as a stand replacing fire in the 1920s is now a dense stand of primarily lodgepole pine with diameters from 5" to 12". With fire suppression much of the south facing slopes have developed patchy dense Douglas-fir thickets. Historically these would have been thinned by fire.

1993 Air Photo

Figure 5

WILDLIFE RELATED ISSUES
AFFECTED ENVIRONMENT

Area Definitions:
The "project area" refers to the specific sections where harvest could occur: T12N- R15W Sections 16 and 21, and totals 800 acres. Portions of both sections in the project area have been previously harvested. The cumulative effects analysis area ("analysis area") refers to the landscape surrounding the project area. This area generally follows ridgelines or other landscape features (Figure 6, Wildlife Analysis Area Map).

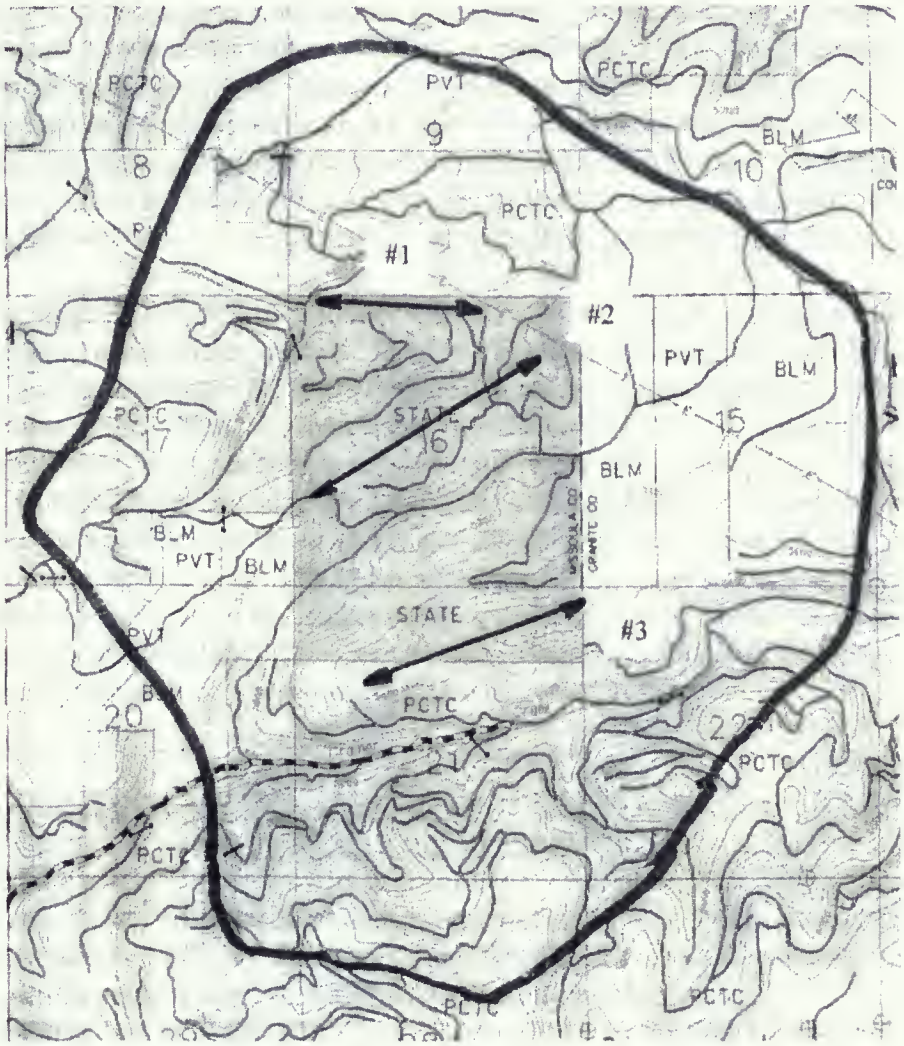
The exterior boundary of the Ryan Gulch fire complex occurs approximately ¼ mile south of the Cramer Creek analysis area. Most of the burned area lies 2-5 miles from the Cramer Creek project area, and is separated from Cramer Creek by a ridgeline. Species that would be attracted to the Ryan Gulch fire area would be relatively uncommon at Cramer Creek, because Cramer Creek does not have burned habitat available. Mike Thompson, MT Department of Fish, Wildlife and Parks area game biologist, described elk use in the Cramer Creek area prior to the fire as relatively low because of extensively harvested industrial private forest land (pers. comm., 9 August 2001). According to Thompson, some elk (up to 100) that would have been found in the Ryan Gulch fire area during hunting seasons prior to 2000 may rely more heavily on the Cramer Creek drainage for security after the fire. Proposed mitigation measures related to overstory cover and potential movement corridors, and road density—all designed with FWP input—would address any big game habitat considerations. For these reasons, the Ryan Gulch complex was not included in the Cramer Creek cumulative effects analysis area. Habitat conditions at Ryan Gulch were discussed in the Ryan Gulch Salvage Harvest E.A., available on the DNRC's web site.

The Tyler Creek Timber Sale occurs approximately 10 miles south of the proposed Cramer Creek Sale. The Clark Fork River and Interstate 90 separate the 2 areas. The E.A. for Tyler Creek was completed in 1999 and is available at Missoula Unit. Tyler Creek was not included in the analysis area because it was located too distant to substantially affect the area. Intervening habitats would be much more likely to be important to analysis in Cramer Creek than the Tyler Creek area.

The proposed Turah Creek Timber sale, (EA in preparation) is located approximately 16 miles west of Cramer Creek. Turah Creek was not included in the Cramer Creek analysis area because Turah Creek was located too distant to affect the area. Intervening habitats would be much more likely to be important to analysis in Cramer Creek than the Turah Creek area.

Figure 6

WILDLIFE ANALYSIS AREA MAP



POTENTIAL MOVEMENT CORRIDORS

TREES OVER 20", SNAGS AND COARSE WOODY DEBRIS PROJECT AND ANALYSIS AREAS AFFECTED ENVIRONMENT

The historic fire regime for the project area is mixed severity. In a mixed severity regime both stand replacing and non-stand replacing fire is common typically creating a mosaic of burned and unburned patches. It would be very possible for a stand to burn in a stand replacing event and then to experience only non-stand replacing burns for an extended period of time. This type of fire cycle can lead to a wide variation in the type of stand present at any given time. Large diameter trees did exist in this type of environment as witnessed by their current presence on site. With fire exclusion in the past 80 years it is possible that the amounts of snags and coarse woody debris are higher now than it was historically as it has been protected from fire.

For this issue, large-sized live trees (greater than 20 inches dbh), large snags, culls, and coarse woody debris were considered together. The State Forest Land Management Plan identifies over 70 species found on Southwest Land Office that depend on snags and over 45 species that depend on coarse woody debris for their breeding and feeding needs (Appendix Tables WLD-17 and 18). The majority of the analysis area has been extensively harvested by several different landowners. As a result, few stands have large trees or snags present. Approximately 460 acres within the proposed project area have 4 trees per acre over 20 inches at DBH and partially closed canopy, these same acres average 1 snag per acre over 15 inches at DBH; none were $\geq$ 21 inches dbh. Snags in the remainder of the analysis area are nearly absent. Harvest of firewood cutting is likely to occur along open roads, which has further reduced the abundance of large snags of desirable species and large coarse woody debris within the project area.

OVERSTORY COVER AND WILDLIFE MOVEMENT CORRIDORS AFFECTED ENVIRONMENT

Project Area:

We assessed overstory cover and potential movement corridors based on connectivity of relatively intact blocks with $\geq$50% canopy cover. The project area has several potential movement corridor areas (Figure-5, Wildlife Analysis Area Map):

1) A small riparian area and spring in the northwest corner of Section 16, that runs southeast to a saddle in the ridge listed below.
2) An east-to-west gentle ridgetop in the center of Section 16.
3) A portion of another ridgetop in the northeastern portion of Section 21.

In the project and analysis areas, one intact area of overstory cover and potential movement corridors is near the northwest corner of Section 16, along an un-named tributary to Camas Creek (#1 above, Figure-5). In addition, the gentle ridge (#2) still has overstory cover, and could

connect to adjacent habitat as trees grow on BLM ownership. It also connects to some limited overstory cover to the west. For the remainder of the project and analysis areas, however, past harvest has decreased all other cover and connectivity. Therefore, the utility of # 3 as a potential movement corridor is lower now than may have occurred historically (Figure-5)

Cumulative Effects Analysis Area:
The state land is largely an island of overstory cover surrounded by areas where overstory cover and movement corridors have been reduced by extensive harvesting

ROAD-BUILDING
AFFECTED ENVIRONMENT

Project Area:
Roads are well-distributed in the project area. Road density is currently 4.1 miles of road per square mile. All roads are currently open. Approximately 1 mile of new road would be needed to access the project area. In general, areas with high road densities provide poorer wildlife habitat than areas with lower road densities (Wisdom 2000).

Cumulative Effects Analysis Area:
Most of the analysis area is highly roaded due to past timber harvest. Road density is 6 miles of road per square mile. Open road density is 1.6 miles per square mile.

CHAPTER IV
ENVIRONMENTAL EFFECTS

INTRODUCTION

This chapter describes the environmental consequences or effects of the proposed action and the cumulative effects of concurrent and future state activities within the analysis area.

EFFECTS ON SOILS

Alternative A- No Action:
Under this alternative there would be no potential for soil compaction or displacement as a result of harvesting activity. Coarse woody debris would continue to accumulate and slowly decay as trees and limbs die and fall to the ground.

Alternative B- Action:
Timber harvest, slash disposal and site preparation can cause rutting, erosion, soil compaction and displacement. The potential for soil impacts is higher on tractor units than it is on cable units. On tractor units the area of detrimental impacts would be limited to 15% or less of the harvest area, by implementing mitigation measures including season of use and skid trail limitations. Units that would be cable logged would have negligible effect on soils. Timber harvest would have a benefit of increasing levels of coarse woody debris on the ground and the proposed action is designed to promote larger diameter classes for long term woody debris. Mitigations including jackpot burning would have a short-term beneficial effect on soil nutrients.

Most of the existing road system crosses well-drained residual soils with high rock contents. Surface erosion can be effectively controlled by installing drainage features on roads and skid trails, followed by prompt revegetation of disturbed soils with site adapted grasses. Potential soil impacts would be avoided or reduced to acceptable levels by implementation of BMP and the following recommendations.

EFFECTS ON WATER QUALITY

Alternative A-No action:
Under the No Action Alternative, existing substandard roads with inadequate road surface drainage would continue to impact water quality and downstream beneficial uses unless mitigation and remedial actions are undertaken.

Alternative B- Action:
The State's Action Alternative would include construction of approximately 1.0 mile of temporary road. Following harvest activities, the temporary road would be ripped, seeded, water-

barred and slashed. DNRC would utilize all reasonable mitigation and erosion control practices during the design, reconstruction and construction of all roads, stream and draw crossings. Site specific design recommendations from DNRC Hydrologist, Soil Scientist and MDFWP Fisheries Biologist would be fully implemented under the action alternative.

Approximately 8.0 miles of existing low standard road would be improved under the action alternative to a standard that meets minimum BMPs. Mitigation measures are expected to improve long-term water quality. Portions of the sale area are drained by ephemeral draws, swales and wet areas that lack discernable stream channels. Equipment restrictions and designated crossings would be utilized to protect all wet areas and ephemeral draws.

Some short-term impacts to water quality may occur due to sediment introduced at stream crossing and ephemeral draw bottoms during or shortly after new road construction activities. Proposed new road construction is considered to have minimal risk to water quality and beneficial uses due to the following reasons:

1. Road locations provide adequate buffer distances from adjacent stream channels.

2. Moderate soil erodibility.

3. The ephemeral nature of the adjacent stream channels.

4. The proposed new roads are temporary and would be ripped, seeded, water-barred and slashed at the end of the sale.

Proper application of BMPs and site-specific designs and mitigation measures including road closures would reduce erosion and potential water quality impacts to an acceptable level as defined by the water quality standards. Erosion control measures and other improvements to the existing road system are expected to result in long-term improvements to downstream water quality and improved protection of beneficial uses. There is little risk of adverse impacts to water quality and beneficial uses occurring as a result of the proposed action alternatives. For a more detailed review of watershed related issues see the hydrologist report in the project file.

Cumulative Watershed Effects:

Alternative A- No Action:
The No Action Alternative would maintain measurable cumulative effects from past management activities, however as hydrologic recovery continues to occur, it is reasonable to assume that these effects would decline.

Alternative B- Action:
Results from the ECA/WY analysis show that projected harvest levels are below those levels

normally associated with detrimental water yield increases and thus channel impacts. Expected water yield increases over current conditions resulting from the proposed sale area within each watershed range from 0.2%-0.3% for the action alternative. Table 2 below summarizes predicted increases in water yield and ECA following the proposed activities for each affected watershed.

TABLE 2.

CRAMER CREEK PROPOSED TIMBER SALE Watershed Proposed Activities ECA/WYI Analysis						
Watershed	Proposed Harvest	Proposed Roads	Proposed ECA	Cumulative ECA	Proposed WYI	Cumulative WYI*
Cramer Creek	359 acres	1.0 miles	135 ac.	3966 ac.	0.3%	10.4%
Camas Creek	133 acres	0 miles	36 ac.	3246 ac.	0.2%	12.3%

* Water Yield Increase (WYI) is an estimate of percent water yield over natural levels due to management activities and the Ryan Gulch Fire.

Estimated increases in average annual water yield due to timber harvest, road construction and the Ryan Gulch Fire in both Camas and Cramer Creek are below thresholds set by DNRC. It is unlikely that the proposed levels of harvest would contribute to detectable increases in water yield or have any measurable influence on downstream channel conditions. *(For a more detailed review of watershed related issues see the hydrologist report in the EA project file.)*

EFFECTS ON FISHERIES

Alternative A- No Action:
The No Action Alternative would continue to impact cold-water fisheries habitat through erosion and sedimentation due to existing road conditions and locations, and the current grazing intensity.

Alternative B- Action:
There are no known fish bearing streams on state land within the proposed sale area. The majority of the drainage features within the proposed sale area are discontinuous with no surface delivery to any fish-bearing streams. The two perennial stream segments within state ownership would not have any harvest adjacent to them. Due to planning and the local stream characteristics, it is unlikely that the proposed timber sale would affect large woody debris recruitment, shade or in-stream temperature into downstream fish-bearing streams.

Cumulative Effects:
The Action Alternative includes improvements to mitigate problems associated with the existing

road system. These improvements are expected to reduce the risk of additional impacts to fish-bearing streams during the proposed sale activities. In addition, these improvements would have a minor long-term positive influence on water quality and fisheries habitat in the watersheds draining the proposed sale area.

EFFECTS ON NOXIOUS WEEDS

Alternative A- No Action:
Under the No-Action Alternative, noxious weeds would continue to spread along open roads and onto dry habitats unabated.

Alternative B- Action:
The Action Alternative would involve ground-disturbing activities that have the potential to introduce or spread noxious weeds in susceptible habitat types. Removal of forest canopy on drier vegetation types (Douglas-fir/snowberry) would increase susceptibility to noxious weed encroachment. For the Action Alternative an Integrated Weed Management (IWM) approach was considered by DNRC to meet the intent of the Montana Noxious Weed Act (7-22-2101 et seg.) and the cooperative agreement with the Missoula County Weed District. For this project a site-specific plan would be developed, combining prevention, revegetation, and herbicide application on roadsides and spot outbreaks which are considered the most effective weed management treatments. Treatment of sensitive road edges (about 3 miles) would reduce the amount of weed seed and slow the spread of noxious weeds. No sensitive plants were noted in the area.

Cumulative effects
Alternative A- No Action and Alternative B - Action
Noxious weeds are wide spread on lands adjacent to the project area. Different landowners have various levels of noxious weed control programs. In general several species of noxious weeds are currently expanding their populations throughout the area and will do so for the foreseeable future under either alternative. Noxious weed spread would reduce forage for livestock and native species. Noxious weeds would also reduce the diversity of the native plant community.

EFFECTS ON NATURAL FOREST CONDITIONS

Alternative A- No Action:
Under the No Action Alternative no harvest would take place. Mature Douglas-fir stands on north slopes would remain much as they are now for the foreseeable future, with slow growth rates and increasing canopy cover. South facing slopes would continue to increase in density primarily as a result of pole size Douglas-fir increasing. Dense lodgepole pine stands resulting from the 1920 era fire would remain in their current dense condition. Growth rates in these

stands would be low as the trees continue to compete with each other for moisture and growing space. Tree mortality would continue as individual trees die from competition stress.

Alternative B- Action:
Under the Action Alternative 360 acres of primarily Douglas-fir stands would be reduced from 120 square feet of basal area per acre to 40. On north facing slopes that are currently even-aged, this would be a shelterwood harvest. Harvesting and jackpot burning should emulate the effects of a hot mixed severity fire and should establish regeneration in much of the stand. On drier south facing slopes stands are more uneven-aged in nature. Harvesting and burning here would emulate a cooler mixed severity fire removing patches of trees and thinning clumps of smaller trees. Regeneration would be established in scattered openings throughout the stand. Commercial thinning in dense lodgepole dominated stands from 150 square feet of basal area per acre to 50 would accelerate the natural thinning process that would occur in these stands. Uncut strips along ridges and draws with canopy cover of more than 50% would be very similar to the areas seen in the 1938 photo that were composed of large trees at fairly high densities and appeared to have burned with a non-lethal fire when adjacent stands experienced stand replacing burns. As has been noted earlier in this document fire can play a variable role in this type of a stand and produce very different types of stand structures.

Cumulative effects
Alternative A- No Action and Alternative B – Action

Implementing either alternative considered in this environmental assessment would have no cumulative effect when consider together with actions taken on other landowner's property. Reducing stand densities would move stands in the project area towards historical conditions. Within the broader analysis area, adjacent landowners have reduced cover to the extent that there is probably less cover than occurred historically.

WILDLIFE RELATED EFFECTS

EFFECTS ON TREES OVER 20" DBH, SNAGS AND COARSE WOODY DEBRIS

Project Area:
Alternative A—No Action:

Without harvest (or disturbance of some type), understory trees would continue to compete with larger, older trees. Large trees would die and provide snag habitat in the short-term. However, fewer medium-sized trees would grow to the large sizes necessary for some wildlife species than if stands were thinned. In addition, without opening stands, fewer western larch would become established, eventually decreasing the supply of large-sized trees of this species. Without

harvest, the risk of stand-replacing fire would be greater than if proposed thinning and pulp wood removal occurred. A stand replacing fire would create many snags and coarse woody debris pieces. Without harvest, however, no large trees would be removed, particularly large Douglas fir. Therefore, these trees would be available as large live trees and later as potential large snag and coarse woody debris pieces. In summary, without harvest (or some other thinning disturbance), there would be a short-term benefit to wildlife species that use trees over 20" DBH, snags and coarse woody debris. Increased risk of stand-replacement fire would be a potential negative effect to species that depend on large trees to meet life requisites, with no action.

Alternative B—Action:
In general, 4 types of treatment would occur (Figure 1):
1) Thinning to 30-40 square feet of basal area in a Douglas fir dominated stand.
2) Thinning to 50 square feet of basal area in a lodgepole pine dominated stand.
3) Thinning a 300-foot wide strip along the south side of the ridge, where 70 square feet of basal area would be retained, average; and
4) No entry along a 300-foot wide strip on the ridgetop and 300 foot-wide strips along riparian areas

In all harvest areas, large western larch and ponderosa pine would be retained. Large Douglas-fir would be removed in all harvest types, although more would be retained in treatment type 3. Large Douglas fir would not be removed in the no entry area, (Type 4). Harvest types 1, 3 and 4 would provide potential recruitment of large-sized snags and coarse woody debris. Approximately 2 large trees per acre (over 20" DBH) would be retained in types 1 and 3. Areas that would undergo the type 2 treatment have very few large Douglas fir currently, however most large Douglas-fir that are present would be retained .

In summary, harvest would have negative and positive effects to the wildlife species that use trees over 20" DBH, snags and coarse woody debris resources. Harvesting would reduce the number of trees over 20" DBH and the short-term recruitment of large snags and coarse woody debris. However, "thinning from below" would promote continued growth of large trees, a long-term benefit to species that depend on large trees and snags to meet life requisites.

Cumulative Effects-Trees over 20" DBH, Snags and Coarse Woody Debris

Alternative A—No Action
The majority of the large trees within the analysis area are found within the project area. Large trees outside the project area are rare. The No Action Alternative would retain large trees in the project area. In relatively dense stands, trees would continue to age and stand densities would increase. Risk of stand replacement fire would increase. Resulting positive and negative effects are the same as those described above, in Alternative A; Trees over 20" DBH, Snags and Coarse Woody Debris. Effects would be to the current stand structures and to associated species that occur in the project area. Species that prefer forest conditions that are more structurally diverse would benefit from retention of such conditions, whereas, wildlife species adapted to thrive in

more open forest environments with low structural diversity would not. Unauthorized firewood cutting would likely continue to occur along open roads, which would reduce the abundance of large snags of desirable species (ie., Douglas-fir and western larch) and large coarse woody debris within the project and analysis areas.

Alternative B—Action:
Trees over 20" DBH and snags are rare in the analysis area. Harvest of some of the largest-sized trees in the project area would further reduce existing numbers in the analysis area, a short-term, cumulative negative effect to species that utilize them for nesting, foraging and cover, However, the larger trees that would be retained would grow more rapidly in a more sustainable condition post-treatment as a result of thinning. Retaining all large-sized larch and ponderosa pine (over 20" DBH) throughout the project area, retaining all large Douglas-fir in unentered stands and retaining 2 per/acre when they are present in lightly harvested Douglas-fir stands would mitigate negative effects. Lodgepole stands have almost no large trees currently. Thinning would provide long-term benefits to species that depend on large trees and snags to meet life requisites, as large tree growth and persistence would be enhanced. Risk of stand loss due to stand-replacement fire would decrease with harvest. Unauthorized firewood cutting would likely continue to occur along open roads, which would reduce the abundance of large snags of desirable species (ie., Douglas-fir, ponderosa pine and western larch) and large coarse woody debris within the project and analysis areas. Additional firewood cutting along new roads proposed under this alternative would likely be minimal, as new road segments would be slashed and made impassible to motorized vehicles after harvest activities are completed. 6 miles of existing open road would also be closed with gates or berms, which would lessen impacts associated with unauthorized firewood cutting.

OVERSTORY COVER AND WILDLIFE MOVEMENT CORRIDORS

Project Area:
Alternative A—No Action:
Without harvest, previously uncut portions of the project area would continue to provide overstory cover and potential movement corridors. Areas with past harvest and resulting fragmentation would continue to have low utility for movement corridors. Without thinning, the largest trees (and crowns) may decline with increasing competition stress. Without thinning, the risk of stand replacement fire would increase in relatively dense portions of the project area, a potential negative effect for species that prefer and utilize overstory cover and movement corridors, however, fire suppression would continue as well.

In summary, without the proposed harvest there would be no short-term change in potential cover and movement corridors in the project area. There would be a potential long-term negative effect to overstory cover and potential movement corridors due to increased risk of loss from fire and insects.

Alternative B—Action: Implementation of the Action Alternative would produce potential negative direct effects to wildlife species that utilize or are dependent upon overstory cover and movement corridors in the project area. However, given the lack of cover in adjacent sections, it is unlikely that important movement corridors occur there now. Retaining overstory cover and potential movement corridors in the along ridges and in draws would mitigate negative effects of harvest in the project area, and promote connectivity on neighboring ownerships as previously harvested stands continue to regenerate and develop. Proposed harvest and pulp removal would reduce the risk of stand-replacement fires, a long-term benefit to species that utilize movement corridors. Thinning in the project area would contribute to tree growth and increased crowns in residual trees—offering benefit to species that are associated with them. Therefore, with mitigation there would be no measurable negative direct effect to species that may utilize movement corridors in the project area.

Cumulative Effects- Overstory Cover and Wildlife Movement Corridors:

Alternative A- No Action:
Levels of cover and of movement corridors would remain unchanged within the analysis area under this alternative.

Alternative B- Action:
Cumulative effects, both negative and positive, would be the same as in the project area. Overstory cover would be reduced over most of the project area, however, not to the levels encountered on the rest of the analysis area. Overall and with mitigation in place, there would be no measurable negative cumulative effect to species that may utilize cover and movement corridors in the analysis area. Retaining overstory cover and potential movement corridors along ridges and draws would mitigate negative effects of harvest in the project area, and promote connectivity on neighboring ownerships as previously harvested stands continue to regenerate and develop.

ROAD BUILDING

Alternative A—No Action:
If harvesting does not occur, no new roads would be constructed, and none of the existing roads within the project area would be closed. There would be no change from current conditions in the project area. Habitat security would remain the same—relatively low—because of fairly high access now. Therefore, current negative effects to wildlife (see Wisdom et al. 2000: 112-137) from roads would continue in the project area at present levels.

Alternative B—Action:
Newly constructed roads would add to the existing road mileage in the analysis area by 1.0 miles. All new and temporary roads would be closed with earth berms or gates. All new and temporary road surfaces would be grass seeded. Gates or berms would close all roads except for the main public road in Section 16 and the access road to a private residence located just west of the project area. This would benefit wildlife species that are otherwise negatively affected by open roads due to expected increases in security.

Cumulative Effects- Road Building

Alternative A—No Action:
Under Alternative A, no cumulative adjustments to existing road densities in the analysis area would occur, thus, cumulative effects to wildlife sensitive to roads and associated disturbance would remain unchanged from the current condition.

Alternative B- Action:
Newly constructed roads would add to the existing road mileage in the analysis area by 1.0 miles. All new and temporary roads would be slashed and closed with earth berms or gates. All roads except for the main public road in Section 16, and the access road to the private residence located near the western boundary of section 16 would be closed by gates or berms. Thus, there would be a net reduction of 6 miles of open road within both the project and analysis areas. This would result in a minor cumulative benefit for wildlife species that may be negatively affected by open roads and related disturbance factors (e.g. illegal access, foot traffic, illegal fire-wood removal etc.).

ECONOMICS

Alternative A- No Action: Under the No Action Alternative no harvesting would take place and no revenue would be generated.

Alternative B- Action: The Action Alternative would have the following economic effects.
Estimated total harvest volume is 21,000 Tons
Stumpage value is $35/Ton
Estimated return to the trust is $735,000

The costs related to the administration of the timber sale program are only tracked at the Land Office and Statewide level. DNRC does not track project level costs for individual timber sales. An annual cash flow analysis is conducted on the DNRC forest product sales program. Revenue and costs are calculated by Land Office and Statewide. These revenue-to-cost ratios are a measure of economic efficiency.

Revenue cost ratios:

	FY97	FY98	FY99	FY00	FY01
SWLO	2.08	1.8	1.44	2.36	2.69
State	1.89	1.7	1.36	2.78	1.62

Literature Cited

Brainerd, S. M. 1985. Reproductive ecology of bobcats and lynx in western Montana. MS Thesis, Univ. Mont., Missoula. 85 p.

Bull, E. L., C. G. Parks, and T. R. Torgersen. 1997. Trees and logs important to wildlife in the Interior Columbia River Basin. U. S. Dept. Agric. For. Serv. Gen. Tech. Rep. PNW-GTR-391. 55p.

Dobkin, D. S. 1992. Neotropical migrant landbirds in the Northern Rockies and Great Plains. Forest Service Northern Region, R1-93-34. Missoula, Montana, USA.

Fischer, W.C., A.F. Bradley. 1987. Fire Ecology of Western Montana Forest Habitat Types. U.S. Dept. Agric. For. Serv. Gen. Tech. Rep. INT-223

Hayward, G. D. 1994. Review of Technical Knowledge: Boreal Owls. Pp89-121 *in* Hayward, G. D., and J. Verner, eds. Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. U. S. D. A. For. Serv. GTR RM-253.

Hillis, J. M., M. J. Thompson, J. E. Canfield, L. J. Lyon, C. L. Marcum, P. M. Dolan, D. W. McCleery. 1991. Defining elk security: the Hillis paradigm Pages 38-43 *in* A. G. Christensen, L. J. Lyon and T. N. Lonner, editors., Proc. Elk Vulnerability Symp., Montana State Univ., Bozeman. 330 pp.

Hejl. , S. J. 1994. Human-induced changes in bird populations in coniferous forests in Western North America during the past 100 years. Pages 232-246 *in* J. R. Jehl and N. K. Johnson, editors. Studies in Avian Biology, No. 15. Cooper Ornithological Society.

Hejl, S. J., R. L. Hutto, C. R. Peterson, and D. M. Finch. 1995. Effects of silvicultural treatments in the Rocky Mountains. Pages 220-244 *in* T. Martin and D. Finch, editors. Ecology and management of neotropical migratory birds. Oxford University Press, New York, New York, USA.

Hutto, R. L., and J. S. Young. 1999. Habitat relationships of landbirds in the Northern Region. United States Forest Service, General Technical Report RMRS-32, Ogden, Utah, USA.

Losensky, B. J. 1997. Historical vegetation of Montana. DNRC Report, Missoula, MT 100pp.

McCallum, D. A. 1994. Flammulated Owl (*Otus flammeolus*). *In* The Birds of North America, No. 93 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences, Washington, D.C.: The American Ornithologists' Union.

Montana Department of Natural Resources and Conservation 1996, Record of Decision, State Forest Land Management Plan. Helena, MT. 42pp. .

Pfister. R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. U. S. Dept. Agric. For. Serv. Gen. Tech. Rep. INT-34. 174pp.

U.S.D.A. Forest Service, Deerlodge National Forest. 1991. Harvey-Eightmile Final Environmental Impact Statement, Butte, MT

Wisdom, M. J., R. S. Holthaausen, B. C. Wales, D. C. Lee, C. D. Hargis, V. A. Saab, W. J. Hann, T. D. Rich, M. M. Rowland, W. J. Murphey, M. R. Eames. 2000. Source Habitats for terrestrial vertebrates of focus in the Interior Columbia Basin: Broad-scale trends and management implications. GTR-PNW-485. Portland, OR.

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APPENDIX A

CHECKLIST FOR ENDANGERED, THREATENED AND SENSITIVE SPEICES
From Section II. 9, DS-252, DNRC Environmental Checklist

Endangered, Threatened, and Sensitive Species	[Y/N] Potential Impacts and Mitigation Measures N = Not Present or No Impact is Likely to Occur Y = Impacts May Occur (Explain Below)
Bald Eagle (*Haliaeetus leucocephalus*) federally-threatened, proposed for de-listing Habitat: late-successional forest < 1 mile from open water	[Low potential for negative effects] Except for migration or possibly looking for carrion during winter and spring, bald eagles probably do not occur in the project or analysis areas. The birds nest and winter along the Clark Fork River, approximately 5 miles south of the project and analysis areas. No nests currently occur within 1 mile of any section proposed for harvest (source: Montana Natural Heritage Program). Many suitable nesting and roosting sites are located closer to the Clark Fork River. If eagles were found, activities would stop and appropriate mitigation would be implemented. **Effects** Alt. A. There would be no change from the current conditions. Alt. B. Because of generally low habitat suitability, and with mitigation in place, there would be low potential for direct negative effects to bald eagles. ***Cumulative Effects:*** Because of generally low habitat suitability, and with mitigation in place, there would be low potential for cumulative negative effects to bald eagles.
Grizzly Bear (*Ursus arctos*), Federally-threatened Habitat: recovery areas, security from human activity	[Low potential for negative effects] Although unlikely, grizzly bears could occur in the project and analysis areas. Grizzlies are wide-ranging mammals that use forested upland habitats. Habitat features attractive to grizzly bears include big game winter ranges, riparian zones, and avalanche chutes. Except for limited riparian areas, these features do not occur in the project or analysis areas. In addition, the project and analysis areas are less remote than preferred grizzly bear habitat. If grizzly bears were found, activities would stop and appropriate mitigation would be implemented. **Effects**: Alt. A. There would be no change from the current conditions. Alt. B. Because of generally low habitat suitability, and with mitigation in place, there would be low potential for direct or indirect negative effects to grizzly bears. ***Cumulative Effects:*** Alt. A Effects would be the same as for Alt. A above. Alt. B. Because of generally low habitat suitability, and with mitigation in place, there would be low potential for cumulative negative effects to grizzly bears.

Lynx (*Felis lynx*), Federally-threatened Habitat: mosaics--dense sapling and old forest >4,000 ft. elev.	[Low potential for negative effects] Lynx have been documented in the vicinity of the project area, and were trapped and radio-collared in a study during the early 1980's in the Garnet Range (Brainerd 1985), in which Cramer Creek is located. One lynx home range was < 15 km from the Cramer Creek project area (Brainerd 1985), a short distance relative to lynx movement capabilities. Therefore, the cumulative effects analysis area for lynx was expanded to include the BLM's Elk Creek Analysis Unit, located approximately 5-6 miles northeast of the project area. Potential lynx denning habitat consists of relatively dense stands (at least 50% canopy closure) of mature to old growth structure at 5,000 feet elevation or higher, in spruce-fir habitats that contain numerous downed logs. There is very little dense cover in either the project or analysis area to provide potential denning habitat. One area of potential denning habitat type (PSME/LIBO/CARU) occurs in the southern portion of Section 16. However, it is relatively small, isolated, and has few logs. A more extensively forested area, a lodgepole stand that includes the PSME/LIBO habitat type is located in the southwestern portion of the project area. However, this stand is fragmented and does not connect to any adjacent habitat in the analysis area. Most of the project area is PSME/SYAL habitat type, which is not preferred for lynx denning. Thus, suitable denning habitat is rare and not likely to develop in the near future in the project area. Snowshoe hare are important lynx prey, and they are associated with young dense lodgepole pine stands. None of these types of stands occur in the project or analysis areas. Suitable foraging stands are from 10-30 years old, the time when stems are most dense and most available to hares. In Section 16, clearcut stand # 7 is 24 years old, nearing the age that is less suitable as foraging habitat. In addition, it was pre-commercially thinned during 1998 to 300 stems per acre. Preferred foraging areas have ≥4,500 stems per acre (LCAS 2000). Tree species in stand # 7 are lodgepole pine and Douglas-fir. Clearcut stands 2, 4, 6, and 12 were harvested in 1989. However, regeneration is not dense. They were planted to approximately 300 stems per acre, 80% ponderosa pine and 20% Douglas-fir. Stand 2 in Section 21 (27 acres), was a shelterwood cut from 1989 as well. Regeneration is scattered Douglas-fir and larch, but only approximately 1 foot tall. Therefore, it has low availability until stems grow above snow levels. If regeneration becomes dense, it could provide foraging habitat, although it would not be in close proximity to potential denning habitat. Potential lynx denning habitat is limited in the analysis area immediately adjacent to the project area, due to extensive past harvest of private industrial forested habitat. Foraging habitat would generally not be widespread in this portion of the analysis area, because dense young stands would be routinely thinned by private landowners. One suitable foraging stand occurs, however, in Section 21 across Cramer Creek and south of the DNRC project area. The stand is approximately 200 acres in size. ***Effects:*** Alt. A Without harvest, stands would continue to age, trees would die, and coarse woody material would be recruited to stands. These would provide direct and indirect benefits to lynx denning habitat. However, trees may not attain the large sizes preferred by lynx as quickly as if stands were thinned. Without harvest, thinning could be accomplished by fire or insect and disease. However, stand-replacement fire could

	also occur. Stand-replacement burns would provide foraging habitat as stands regenerate with seedlings and saplings, but would substantially increase the time necessary to provide potential denning habitat. Thus, stand-replacement fire could have both positive and negative effects to lynx habitat, depending upon the type of habitat considered. No roads would be closed in the DNRC sections without harvest, a potentially negative effect to lynx security. Alt. B Harvest would remove large-sized trees from the project area, a direct and indirect (to recruitment of large pieces of CWD) which would in turn negatively effect potential lynx denning habitat. Negative effects would be reduced by retaining large-sized trees in unharvested and lightly-harvested areas. These areas are located in areas particularly attractive to lynx, draws and ridge tops. Thinning would promote growth of remaining trees. This would provide a long-term benefit to potential lynx denning habitat, if trees were allowed to be recruited to large pieces of coarse woody debris. Post-harvest, the non-public roads in both sections would be closed (map files, Missoula Unit), a benefit to potential lynx security. Foraging habitat would probably not be affected by the proposal. Given the low likelihood of lynx currently using the project area, and with listed mitigations, negative direct and indirect effects to potential lynx denning habitat would be minimal. ***Cumulative Effects:*** Alt. A. Most stands in the portions of the analysis area immediately adjacent to the project area have already been harvested to some degree. Therefore, there would be a cumulative benefit to retaining cover for lynx in the near term by no action. The extent of benefit would depend on factors that affect the growth and persistence of large-sized trees (see direct and indirect effects listed above). No roads would be closed with the no action alternative, a negative cumulative effect to lynx security. In the Elk Creek LAU, habitat conditions would remain as they currently are, except for portions proposed for thinning and prescribed burning in the BLM and DNRC Elk Creek Projects 2000. The DNRC project is still in the planning phase. The Elk Creek projects 2000 were expected to improve lynx habitat in 2-3 decades (Dave McCleerey, BLM Wildlife Biologist, Biological Assessment, 1 August 2000). Alt. B. Cumulative effects would be similar to direct and indirect effects listed above, plus the effects attributed to proposed actions in the Elk Creek LAU. Given the low amount of suitable habitat in the project area, the additive effect of the proposed Cramer Creek project with the Elk Creek projects would be relatively low at the landscape scale. With listed mitigations in place to address overstory cover and movement corridors, effects to large-sized trees, and road density, negative cumulative effects to potential lynx denning habitat would be minimal. There would be long-term cumulative benefits as residual trees grow to larger diameters. Foraging habitat would remain relatively unchanged except for successional processes.
Gray Wolf (*Canis lupus*), Federally-endangered	[Low potential for negative effects] Gray Wolves are wide-ranging mammals that use forested upland habitats, so they could wander into the project or analysis areas. There are no documented dens in either area (Joe Fontaine, USFWS, 25 July 2001.) No key big game winter range occurs in the project or analysis areas. In addition, the project and analysis areas are less remote than preferred wolf habitat. If wolves were found

Habitat: ample big game populations, security from human activity	activities would stop and appropriate mitigation would be implemented. **Effects** Alt. A. There would be no change from the current conditions. Alt. B. The project and analysis areas have low quality, due to few key feeding habitats and low habitat security. With mitigation in place, there would be low potential for direct negative effects to wolves. ***Cumulative Effects:*** Because of generally low habitat suitability, and with mitigation in place, there would be low potential for cumulative negative effects to gray wolves.

Pileated Woodpecker (*Dryocopus pileatus*) Habitat: late-successional ponderosa pine and larch-fir forest	[Low potential for negative effects] Nesting habitat for this bird occurs in the project area, but it is limited to scattered remnant snags. The birds also use large-sized Douglas-fir for feeding, and these trees currently occur in the project area. Old feeding sign was noted in Section 21 in remnant larch trees. Little feeding and nesting habitat occurs in the analysis area, due to previous timber harvest. **Effects**: See effects to the issues: Large-sized Trees, Snags, and Coarse Woody Debris; and Road building. Alt. A. There would be no change from the current conditions. As large trees subsequently die, feeding and nesting habitat would be increased, a direct and indirect (as snags become CWD) benefit to this species. Alt. B. Proposed harvest would remove some large-sized Douglas-fir from the project area. This would decrease foraging habitat for pileated woodpeckers, a direct negative effect to the species. Negative effects would be mitigated by retaining large Douglas-fir trees in unentered and lightly-entered areas, and from "thinning from below" treatments. Nearly all large-sized ponderosa pine and western larch would be retained as well. Thus, negative effects would be minimal, and benefits would occur as a result of thinning. No snags would be removed, unless they were a danger to safe harvesting operations. Also, cull trees, potential nesting and feeding habitat would be retained. Non-public roads would be closed in the project area. This would decrease the area available for trespass firewood cutting, a benefit to retaining feeding and nesting habitat for this bird. Machinery would break up some coarse woody debris, but this would be mitigated by leaving slash and large pieces of coarse woody debris in the woods after harvest. ***Cumulative Effects***: Alt. A. Because most of the analysis area has already been harvested, the decrease in suitable nesting and foraging habitat has already occurred. No changes from the current condition would be expected. Unauthorized firewood cutting would likely continue to occur along open roads, which would reduce the abundance of large snags of desirable species (ie., Douglas-fir, ponderosa pine and western larch) and large coarse woody debris within the project and analysis areas. Alt. B. Unauthorized firewood cutting would likely continue to occur along open roads, which would reduce the abundance of large snags of desirable species (ie., Douglas-fir, ponderosa pine and western larch) and large coarse woody debris within the project and analysis areas. Additional firewood cutting along new roads proposed under this alternative would likely be minimal, as new road segments would be slashed and made impassible to motorized vehicles after harvest activities are completed. Six miles of existing open road

	would also be closed with gates or berms, which would lessen impacts associated with unauthorized firewood cutting. Because most of the analysis area has already been harvested, the decrease in suitable nesting and foraging habitat has already occurred. With mitigation in place, there would be low potential for cumulative negative effects to this species.
Flammulated Owl (*Otus flammeolus*) Habitat: late-successional ponderosa pine and Douglas-fir forest	[Low potential for negative effects] Potential flammulated owl nesting habitat is limited in the project area, due to low numbers of snags. Open habitats occur for feeding, but large-sized trees from which to forage are limited. Less nesting and feeding habitat occurs in the remainder of the analysis area, due to previous and extensive timber harvest. **Effects**: See effects to the issues: Large-sized Trees,Snags, and Coarse Woody Debris; and Road building. Alt. A. There would be no change from the current conditions. As large trees subsequently die, feeding and nesting habitat would be increased, a direct benefit to this species. Alt. B. Large Douglas-fir would be removed from the project area, a direct negative effect to potential flammulated owl nesting habitat. However, with mitigation (unentered areas and retention of large ponderosa pine and western larch), negative effects would be mitigated. As preferred retained trees grow larger, there would be a long-term benefit from "thinning from below". In addition, opening stands in close proximity to suitable perch sites would produce potential feeding areas for owls, a slight direct benefit to this species, considering how open the analysis area is currently. Overall, there would be low potential for negative effects to flammulated owl populations. ***Cumulative Effects*** Alt. A. Because most of the analysis area has already been harvested, the decrease in suitable nesting habitat has already occurred. Unauthorized firewood cutting would likely continue to occur along open roads, which would reduce the abundance of large snags of desirable species (ie., Douglas-fir, ponderosa pine and western larch) and large coarse woody debris within the project and analysis areas. Alt. B. Because most of the analysis area has already been harvested, the decrease in suitable nesting habitat has already occurred. With mitigation in place, there would be low potential for cumulative negative effects to populations of this species. Unauthorized firewood cutting would likely continue to occur along open roads, which would reduce the abundance of large snags of desirable species (ie., Douglas-fir, ponderosa pine and western larch) and large coarse woody debris within the project and analysis areas. Additional firewood cutting along new roads proposed under this alternative would likely be minimal, as new road segments would be slashed and made impassible to motorized vehicles after harvest activities are completed. Six miles of existing open road would also be closed with gates or berms, which would lessen impacts associated with unauthorized firewood cutting .

Coeur d' Alene Salamander (*Plethodon idahoensis*) Habitat: waterfall spray zones, talus near cascading streams	[N] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative.
Boreal Owl (*Aegolius funereus*) Habitat: mature to late-successional forest >5,200 ft. elev.	[N] The project and analysis areas contain almost no suitable habitat for this species. Very little of the project or analysis areas is > 5,200 feet elevation, and stands are not subalpine fir and spruce. Thus, boreal owls would not likely occur in the project or analysis areas. Therefore, there is no potential for effects to this species from either alternative.
Fisher (*Martes pennanti*) Habitat: dense mature to old forest <6,000 ft. elevation and associated with riparian	[N] No preferred habitat, old growth riparian with abundant, large pieces of downed woody debris occurs in the project area. The only perennial water in the project area is located in the NW corner of Section 16, and it consists of 2 small springs that immediately flow out of the project area as un-named tributaries of Camas Creek in the analysis area. Otherwise in the analysis area, previously harvested habitats in Cramer Creek have no overstory cover and low densities of coarse woody debris and large-sized snags (Air Photo Wildlife Analysis Area Map). Some residual cover occurs along the un-named tributaries to Camas Creek. However, that area is fragmented, isolated, and the habitat patches are relatively small (~ 1 mile long, but with no connectivity to other habitat). Thus, no extensive blocks of preferred cover types are found in the project or analysis areas. Thus, fisher would not likely occur in the project or analysis areas. Therefore, there is no potential for effects to this species from either alternative.

Black-Backed Woodpecker (*Picoides arcticus*) Habitat: recently-killed (burned) standing dead trees (stand-replacement burned habitat) or beetle-infested forest	[Low potential for negative effects] No preferred habitat currently occurs in the project or analysis areas. The closest available habitat is the Ryan Gulch fire complex (17,000 acres). The exterior boundary of that fire is located ¼ mile south of the Cramer Creek analysis area, and the bulk of the fire complex is 2-4+ miles away. **Effects:** Alt. A. With no harvest, risk of stand-replacement fire would increase in the project area. If a stand-replacement fire occurred, then black-backed woodpecker feeding and nesting habitat would be created, a direct benefit to this species. Alt. B. With harvest, risk of stand-replacement fire would decrease (under average weather conditions). Reduced fire risk would be a potential indirect negative effect to potential black-backed woodpecker habitat. With harvest, some large Douglas-fir trees would be removed, a potential negative direct effect to components of black-backed woodpecker feeding habitat. However, potential for negative effects would be mitigated by retaining large Douglas-fir in unentered and lightly-harvested areas. In addition, harvest

	would promote growth of residual trees, a long-term benefit to some components of black-backed woodpecker habitat. Overall, there is low potential for negative effects to populations of this species. ***Cumulative Effects***: Alt. A. If a large, stand-replacing fire occurred in the analysis area, the resulting burned habitat would have relatively low suitability because tree density is low and few large-sized trees occur there. Therefore, there would be little potential cumulative benefit to black-backed woodpecker habitat by the No Action Alternative. Alt. B. Given low tree densities in the analysis area and few large-sized trees there, the decrease in fire risk from implementing Alt. B would have no measurable effect to black-backed woodpecker populations.
Northern Bog Lemming (*Synaptomys borealis*) Habitat: sphagnum meadows, bogs or fens with thick moss mats	[N] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative.
Peregrine Falcon (*Falco peregrinus*) Formerly federally-threatened, recently de-listed Habitat: cliff features near open foraging areas or wetlands	[N] Peregrines may migrate through the project or analysis areas. However, no preferred habitats (cliff faces at least 50 m tall in proximity to abundant prey production areas) occur in the project or analysis areas. To date, no peregrine falcons have been seen in the project area, and none were recorded within 1 mile (Montana Natural Heritage Program Data). If birds were found, activities would stop and appropriate mitigation would be implemented. Therefore, no negative direct or cumulative effects are expected to occur as a result of either alternative.
Common Loon (*Gavia immer*) Habitat: cold mountain lakes, nest in emergent vegetation	[N] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative.

Harlequin Duck (*Histrionicus histrionicus*) Habitat: white-water streams, boulder and cobble substrates	[N] No preferred habitat occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative.

Ferruginous Hawk (*Buteo regalis*) Habitat: prairies and badlands	[N] This bird is only occasionally reported from west of the continental divide in Montana during winter. No confirmed nest sites occur west of the divide in Montana. The one unconfirmed report in Skarr (1975) is likely an error (Jeff Marks, Ornithologist, University of MT, personal communication spring 2001). Thus, there is no potential for effects to this species from either alternative.
Columbian Sharp-Tailed Grouse (*Tympanuchus phasianellus columbianus*) Habitat: grassland, shrubland, riparian, agriculture	[N] This species is only confirmed breeding in extreme northwestern Montana, near Eureka. A population of sharp-tails near Ovando has not been confirmed to be the Columbian subspecies. Thus, there is no potential for effects to this species from either alternative.
Mountain Plover (*Charadrius montanus*) Habitat: short-grass prairie, alkaline flats, prairie dog towns	[N] No short-grass prairie with prairie dog towns occurs in the project or analysis areas. Thus, there is no potential for effects to this species from either alternative.
Townsend's Big-Eared Bat (*Plecotus townsendii*) Habitat: caves, caverns, old mines, large-hollow snags	[N] There are no known caves or complex mines in the project or analysis areas. Mines occur outside the analysis area, however. This bat species is almost exclusively associated with caves and mines for winter roosting and summer maternity habitat. Snags are rarely used (Western Bat Working Group Training, August 1999). If this species were found, activities would stop and appropriate mitigation would be implemented. With mitigation in place, there would be no appreciable negative effects expected to Townsend's Big-eared Bats from either alternative.
Other Species of Concern	
Northern Goshawk (*Accipiter gentilis*)	[N] Goshawks nest in relatively dense late-successional forests, usually in close proximity to water. Downed logs provide habitat for goshawk prey, and goshawks forage in a variety of forest structural stages including openings. The project provides some potential goshawk nesting habitat, but the analysis area provides little because past harvest has removed potential nest sites. Effects would be similar to those reported in the issues: Large trees, Snags, and Coarse Woody Debris; and Overstory Cover and Potential Movement Corridors. With mitigation in place, little appreciable negative direct or cumulative effects to goshawk populations would be expected.

Literature Cited

Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest Habitat Types of Montana. USDA Forest Service, GRT INT-34.

McCallum, D. A. 1994. Flammulated Owl (*Otus flammeolus*). *In* The Birds of North America, No. 93 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences, Washington, D.C.: The American Ornithologists' Union.

Skarr, P. D. 1975. Montana Bird Distribution. Published by the author, Bozeman, MT.

LCAS. 2000. Lynx conservation assessment and strategy. USDA Forest Serv., USDI Fish and Wildl. Serv., USDI, Bureau of Land Mgmt., USDI National Park Serv., Forest Serv. Publ. #R1-00-53.

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